

**Scottish Executive
Environment and Rural Affairs Department**

Environmental Research

2007

Local Authority - Carbon Trading Scheme

**A report produced for The Scottish Executive as part of the
Scottish Climate Change Programme Review**



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This project was commissioned in 2005 as part of the review of Scotland's Climate Change Programme, published in March 2006. It reflects the position at the time the report was produced.

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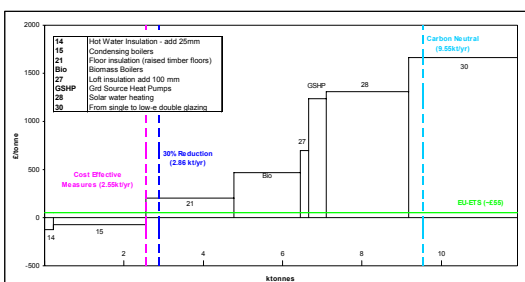
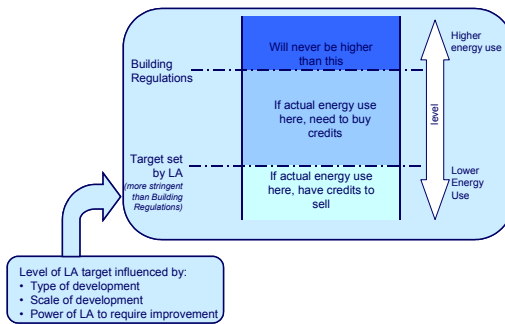
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Local Authority – Carbon Trading Scheme

A Feasibility Study

Produced by AEA Energy & Environment

Summary Report



For the Scottish Executive

October 2006

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EXECUTIVE SUMMARY

Background

Climate change is widely recognised as the most serious environmental threat facing our planet. The Scottish Executive is committed to contributing equitably to the UK's Kyoto Protocol target and to assisting the UK Government in moving towards its more ambitious carbon dioxide emissions reduction goals.

As part of the formal review of the Scottish Climate Change Programme (SCCP), published on 30 March 2006, the Executive has re-evaluated its contribution to UK climate change commitments and considered the scope for strengthening existing measures and for introducing new ones to deliver further cuts in Scotland's greenhouse gas emissions. The SCCP represents a stepping up of the Executive's ambition and action to tackle climate change and quantifies for the first time Scotland's equitable contribution to UK climate change commitments in carbon terms - the Scottish Share. Furthermore, it sets an ambitious Scottish Target to exceed the Scottish Share of the UKCCP savings target by 1 million tonnes of additional carbon savings in 2010.

In light of this the Executive is exploring a number of measures that may merit further investigation.

One idea that is being evaluated is a possible carbon trading scheme for new building development projects, which could include measures to reduce the carbon emissions of a new development or 'offset' part, or all, of the resultant carbon emissions by other indirect measures.

In order to assess the merits of these measures research is required into the potential costs, potential CO₂ savings and practical issues, including the availability of powers to operate such a scheme.

This report summarises the research undertaken, the full details are provided in two further volumes.

Research Findings

The research examined many aspects of carbon trading, recognising that carbon trading can take many forms and that the methodologies and rules for a carbon trading scheme need to be tailored to the situation of the participants.

The research examined the opportunity for carbon trading to achieve better levels of energy use than required by the building standards.

The research estimated that the carbon emissions due to the heating needs of new developments in the domestic and non-domestic sectors in Scotland is 15 ktC pa. Hence if new developments were to be to carbon neutral, i.e. zero carbon emissions from energy use, the contribution to the SCCP is modest, but will accumulate with each year's new build. Thus 10 years of carbon neutral development would save up to 150 ktC p.a.

This summary report reviews each of the main issues associated with carbon trading for new developments, while this Executive Summary draws these results together to consider five possible options.

1. Do Nothing

Given the new Scottish Target in the SCCP, there is a need for new policy measures to reduce emissions across all sectors of the economy including new buildings. Furthermore UK policy on energy and climate change points to further pressure to reduce carbon emissions, e.g. the aspiration for a 60% reduction by 2050. Importantly, the standards of today's new buildings will influence emissions far into the future. Hence the option to do nothing further to reduce emissions from new buildings would be out of step with this backdrop.

2. Raising the Building Standards

The energy used in new buildings, and hence carbon emissions, have been progressively reduced as the building regulations have set more stringent standards. The next set of changes for Scotland are being finalised in 2006 for implementation in 2007. The present proposals for 2007 are expected to reduce energy use by 23%. The next revision is likely to commence in 2009 and will reduce energy further. The expectation is that future trend will be for energy standards to become increasingly stringent.

Clearly this trend is beneficial, supports the SCCP and longer-term carbon reduction aspirations and should continue. However there is a law of diminishing returns that means that the costs of achieving further savings becomes progressively higher. These costs typically stem from the diminishing returns from simple energy savings measures such as adding progressively greater layers of insulation and from the use of technology measures that are more expensive such as micro renewables.

Hence if carbon trading or carbon offsetting can offer a complementary but additional carbon reduction at lower cost, this is worth serious consideration.

3. Carbon Offsetting

Carbon offsetting is a simple form of carbon trading by which an organisation or individual can invest in carbon-saving projects to 'neutralise' an amount of carbon dioxide emissions. At its simplest level, an individual could invest in tree planting to offset the carbon emissions produced by a holiday flight; at its most complex, an organisation could analyse its whole mode of working and commit to long-term investment in a renewable energy technology.

One form of carbon offsetting is planting trees. Trees absorb CO₂ and, via photosynthesis, release oxygen. Most tree-planting schemes are based on a 100-year time-span, with the necessary CO₂ emissions being absorbed over that time. There are considerable long-term risks (agriculture, disease, etc.) that may prevent a planted tree reaching the necessary maturity to offset the CO₂. Where tree planting is to be considered, it should be in a sustainably managed forest planted with native species to encourage local biodiversity. More trees than required should be planted to give the best chance of the required minimum reaching maturity.

A significant amount of land would be required if this form of offsetting was to be used extensively. The market research found concerns about tree planting offsets amongst local

authorities. These included the concern over the amount of land, and that the economic and environmental benefits would not be local.

The research found that other forms of offsetting scheme had been developed by some local authorities in England.

4. Offset Funds

Offset funds are a specific form of carbon offsetting that has been developed by a number of local authorities in England, notably Newcastle and Milton Keynes.

Milton Keynes Council have a Sustainable Construction policy in their Local Plan (Town and Country Planning Act 1990) for any development of more than 5 dwellings or 1,000 m² (for non-residential use). One of the requirements in the Local Plan relates to the “carbon neutrality” of a development. They specify that the development should either be neutral, or if not, the resultant carbon emissions should be mitigated by paying money into a Carbon Offset Fund. This money can then be invested elsewhere (locally) in carbon saving activities, such as solutions for fuel poverty, and developing local expertise and a technology base in low Carbon Technologies. Investment in tree planting schemes that would enhance Milton Keynes' green spaces has not entirely been ruled out, but this is considered to be less cost effective than other measures.

This form of scheme addresses the concerns raised by local authorities. In addition, by investing in retrofitting energy saving measures in homes suffering fuel poverty this will achieve carbon savings at a much lower cost and address a major social and economic problem.

A key advantage of the offset fund is that the investment is in energy efficiency measures such as basic insulation that are highly cost effective.

5. Carbon Trading

Carbon trading schemes are considered a more cost effective alternative to stricter regulation due to the simple principle of allowing an organisation with a lower cost of abatement to sell surplus credits to an organisation with higher costs of abatement. Defra quote that¹:

“Emissions trading is emerging as a key instrument in the drive to reduce greenhouse gas emissions. The rationale behind emission trading is to ensure that the emission reductions take place where the cost of the reduction is lowest thus lowering the overall costs of combating climate change.”

The US lead-in-gasoline reduction programme (launched in the mid-1970s), the SO₂ trading programme, and the Los Angeles RECLAIM (Regional Clean Air Incentives Market) programme are among the best known early examples of emissions trading.

In the UK examples include the UK Emissions Trading Scheme, set up as a pilot for the wider EU Emissions Trading scheme.

¹ Defra website, <http://www.defra.gov.uk/environment/climatechange/trading/>

The economic analysis for this research project compares direct implementation of energy efficiency and renewable energy measures for new dwellings with the cost of trading in the EU-ETS. Two targets are considered for new homes, a 30% reduction over the levels likely to be required by the 2007 building regulations and 100% saving i.e. carbon neutrality.

We conclude that carbon trading could offer significant and valuable benefits, up to £5 million a year, if carbon neutrality were to be the aim, as to achieve carbon neutrality would require extensive use of less cost effective measures such as biomass boilers, ground source heat pumps and solar water heating, along with very high levels of insulation.

For smaller reductions up to 30% direct measures may be more effective and the potential benefit of carbon trading is not as convincing.

The concept of carbon trading is relatively new and is totally new to the sectors and sizes of development considered in this study. This brings some uncertainty over the costs and benefits of the scheme as well as a need to investigate in much greater detail the rules that would govern this type of scheme. In addition no significant views were offered by the construction sector on the carbon trading concept or the options for the implementation of the scheme. In these circumstances it would be premature to recommend a mandatory carbon neutral trading scheme.

However in the long term, taking aspirations for 2050 into account, the aim of carbon neutrality for new building developments, and hence a possible role for carbon trading, cannot be ruled out for the future.

Practical Issues

The research examined a number of practical issues associated with carbon trading, including the benchmarking tools, the number of developments that would be covered, along with examples of initiatives that are already undertaken by some local authorities. This summary report and the detailed volumes describe these in detail.

Conclusions & Recommendations

We conclude that there is a strong and increasing need to implement further initiatives that deliver carbon savings for new building developments. Carbon trading is proven as an effective way to deliver carbon savings at lower costs. However in the case of new building development in Scotland, the scale of carbon savings on offer is modest and carbon trading is not the simplest policy measure to set up and administer. In addition the benefits of carbon trading are not significant unless the reduction targets are set at very high levels. So in the short to medium term we conclude that carbon trading for new building developments should not be implemented.

This said, the research found examples of initiatives undertaken by local authorities in England that incorporate some of the elements of a trading scheme. In particular the offset fund approach used in Newcastle and Milton Keynes addresses some of the problems of the high cost of measure needed to make significant savings, yet avoids the complexity of full carbon trading and addresses some of the concerns expressed for other forms of carbon offset.

While these examples are in their early days, they could provide a valuable and worthwhile route for local authorities in Scotland to address the emissions of new buildings in the short to medium term.

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1 INTRODUCTION

Climate change is widely recognised as the most serious environmental threat facing our planet. The Scottish Executive is committed to contributing equitably to the UK's Kyoto Protocol target and to assisting the UK Government in moving towards its more ambitious carbon dioxide emissions reduction goals.

As part of the formal review of the Scottish Climate Change Programme (SCCP), published on 30 March 2006, the Executive has re-evaluated its contribution to UK climate change commitments and considered the scope for strengthening existing measures and for introducing new ones to deliver further cuts in Scotland's greenhouse gas emissions. The SCCP covers action across all of the key sectors of Scotland's society and economy, including energy; transport; agriculture, forestry and land use; business; and the residential sector. It represents a stepping up of the Executive's ambition and action to tackle climate change and quantifies for the first time Scotland's equitable contribution to UK climate change commitments in carbon terms - the Scottish Share. Furthermore, it sets an ambitious Scottish Target to exceed the Scottish Share of the UKCCP savings target by 1 million tonnes of additional carbon savings in 2010.

In light of this the Executive is exploring a number of measures that may merit further investigation.

One idea that is being evaluated is a possible carbon trading scheme for new building development projects, which could include measures to reduce the carbon emissions of a new development or 'offset' part, or all, of the resultant carbon emissions by other indirect measures.

In order to assess the merits of these measures research is required into the potential costs, potential CO₂ savings and practical issues, including the availability of powers to operate such a scheme.

This report summarises the research undertaken, the full details are provided in two further volumes:

Phase 1 – Initial Research – this covers: case studies, benchmarking tools, scheme definitions and carbon trading models

Phase 2 – Detailed Research – this covers: market research and economic analysis

2 WHAT IS CARBON TRADING?

Carbon trading schemes can be used as an alternative to stricter regulation through the simple principle of allowing an organisation with a lower cost of abatement to sell surplus credits to an organisation with higher costs of abatement.

A simple example of an opportunity to trade would be for a developer who is renovating a historic building where there are constraints over the use of modern energy saving techniques. Instead of making direct reductions in energy and carbon emissions, the developer may use trading to buy carbon reduction credits from another source not subject to the same constraints.

The remaining sections of this summary report are written in the form of a series of questions, with the findings of the research project forming the response to each question.

3 WHY USE CARBON TRADING?

To achieve progressively better energy and carbon emissions from new buildings will require developers to apply increasingly expensive materials and technologies. The most obvious example of this is insulation where doubling the thickness of insulation will not halve the energy losses from a building, due to the laws of diminishing returns. The cost effectiveness (in terms of £/tonne carbon saved) of adding additional insulation to a new well insulated building will be higher than adding insulation to existing buildings with low, or non existent, levels of insulation. Carbon trading would allow developers to find alternative, lower cost, opportunities for carbon reduction.

A carbon trading scheme could provide incentives for local carbon reduction projects in return for developers implementing measures to reduce or offset a certain percentage of the carbon emissions associated with any new development. The incentive scheme could be structured such that carbon reduction measures are delivered where they are most cost-effective (such as tradeable credits or offset funds). The introduction of such a regime could also act as an incentive to developers to improve the resource/energy efficiency of a development, thereby reducing the scale of the offsetting measures.

Carbon trading schemes are considered a more cost effective alternative to stricter regulation due to the simple principle of allowing an organisation with a lower cost of abatement to sell surplus credits to an organisation with higher costs of abatement. Defra quote that²:

“Emissions trading is emerging as a key instrument in the drive to reduce greenhouse gas emissions. The rationale behind emission trading is to ensure that the emission reductions take place where the cost of the reduction is lowest thus lowering the overall costs of combating climate change.”

² Defra website, <http://www.defra.gov.uk/environment/climatechange/trading/>

The US lead-in-gasoline reduction programme (launched in the mid-1970s), the SO₂ trading programme, and the Los Angeles RECLAIM (Regional Clean Air Incentives Market) programme are among the best known early examples of emissions trading. For a carbon trading scheme to work, there must be developers with good resources to over comply, and developers with access to poorer sustainable development prospects to under comply, otherwise trade would simply not occur and the system would be ineffective.

4 WHAT NEW DEVELOPMENTS WOULD BE INCLUDED?

There are typically 23,500 new domestic dwellings built in Scotland each year. Potentially, all new build in Scotland could be covered by a carbon trading scheme. Indeed some respondents to the survey in Phase 2 advocated this. In principal this would cover 23,500 new homes, along with 700,000 m² of non-domestic development. However, other factors would influence the implementation of a scheme such as:

- Smaller developments are likely to be excluded due to the lower benefits and higher costs for participants.
- If the scheme is voluntary, it is likely that only a proportion of the local authorities and developers in Scotland will take part in the scheme.

Trading schemes typically have a de-minimis threshold below which participants are deemed to be excluded from the scope of the scheme. For example, facilities with combustion installations fall into the EU-ETS. However the rules specify that only facilities with a combined installed capacity of 20 MW (thermal input) are included.

The use of such a de-minimis threshold reflects:

- The costs of entering into a trading scheme, in terms of the costs of setting up targets, achieving the target levels of emissions and any transaction costs for making trades.
- The cost of ongoing compliance, assessing performance against agreed targets.
- The lower level of emissions reduction potential for small participants.

The analysis of the possible **de minimis thresholds** (Section 3 of Phase 1 report) shows:

- For domestic properties that a threshold of 15 homes or more in any one development would be likely to cover 80% of domestic developments and hence 80% of carbon emissions from domestic developments. In Scotland, this is typically 18,800 new homes per annum. This is based upon threshold limits used within the case study examples (Phase 1 Report, Section 2).
- That data for non-domestic developments, e.g. the number, type and size of developments, are not readily available. Hence at this stage it has not been possible to make a rigorous assessment of the amount of development that would be included by a threshold. However the Energy Performance in Buildings Directive threshold of 1,000 m² is a useful guide.

Insufficient detail was available on the rate of commercial and industrial new builds, hence the Scottish Building Standards Agency (SBSA) estimate of 700,000 m² p.a. has been used in this research. All of the commercial and industrial new build is assumed to be covered in any carbon trading scheme.

5 WOULD ALL LOCAL AUTHORITIES BE INVOLVED?

Another issue worthy of consideration is whether or not there should be a threshold at which local authorities would be encouraged, or obliged, to participate in any voluntary or mandatory scheme, in order to ensure administrative costs were maintained at a suitable and realistic level.

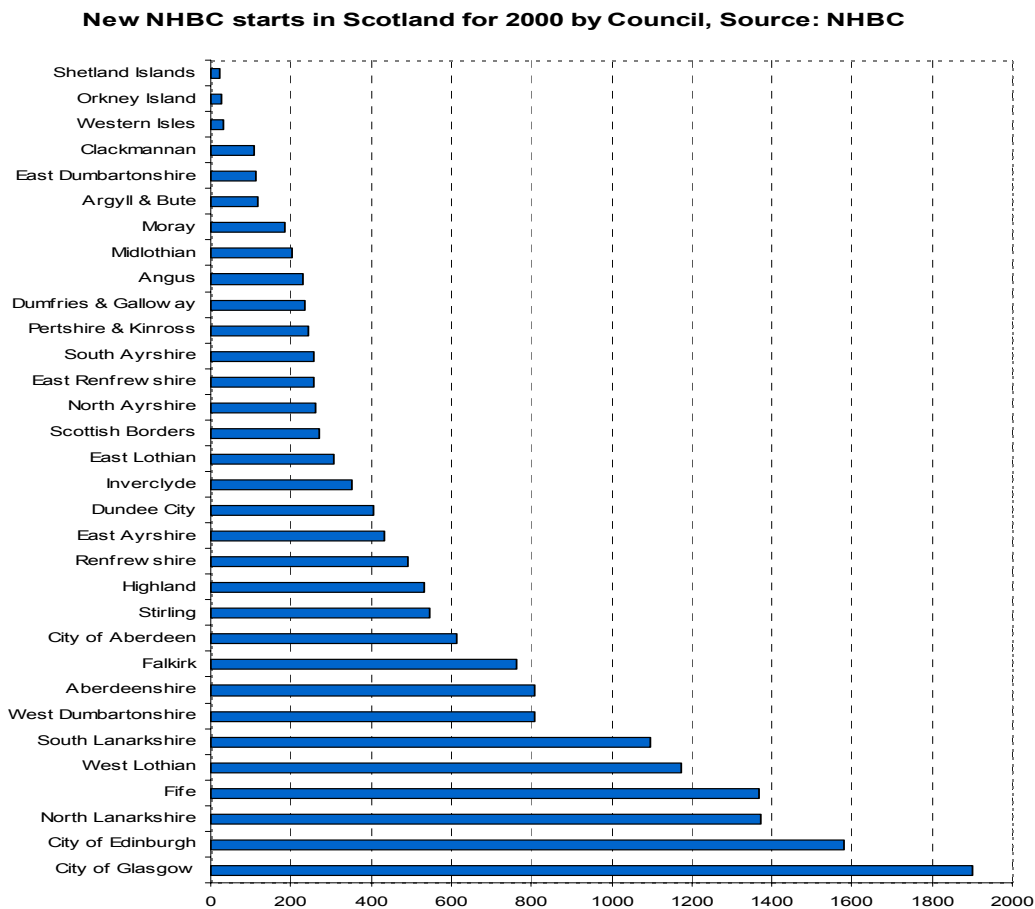


Figure 1 New Starts by Local Authority Area³

On first inspection of Figure 1, which shows the spread of new domestic starts across all Scottish local authorities for 2000, it seems reasonable to assume that some sort of threshold could be formed on the basis of the numbers of developments occurring in each area. For example, if the limit were to be set at 200 new starts then this would cover approximately 16,500 new starts for that year across 25 local authorities.

However, when the figures for 1999 are considered it becomes clear that the annual variation in new starts would result in a constantly moving target with respect to the

³ Source: NHBC, 2005

threshold limits and mean that some councils could be eligible for participation one year but below the threshold in a subsequent year.

As an example, the figures for West Dunbartonshire new starts vary between 147 in 1999, to 808 in 2000, which would have meant the local authority would have been encouraged or required to participate in 2000 but not in 1999.

This would obviously result in an unwelcome situation and demonstrates that, although this could be a consideration for the design of the scheme, another means of specifying the level at which local authorities should participate would be required.

This issue is felt to be one that should be included in the detailed design of the scheme rules - if the feasibility of a carbon trading scheme be deemed positive - and as such is not considered further in the study.

The use of 18,800 new dwellings for the assessment of the potential economic impact is therefore supported both by consideration of local authority size, and development size.

6 HOW WOULD THE CARBON EMISSIONS BE ASSESSED?

For a carbon trading scheme to operate carbon emissions from new buildings must be assessed using suitable tools that provide confidence to scheme participants and the authorities monitoring the scheme. Ideally the assessment of carbon emissions for new developments would be based around an existing benchmarking methodology rather than inventing a new one.

The research identified at an early stage the need to define what the assessment was expected to cover. In particular there was a debate over the difficulty of verifying emissions if the scheme were to be based upon an assessment of the operational use (i.e. based on actual measured carbon emissions whilst in operation), as opposed to an asset based approach (estimated emissions based on capacities and other operational parameters of energy consuming equipment). A number of factors mean that an asset based approach is the most practical option. One of these factors is that neither a developer nor a local authority has power to influence how an occupier uses energy in their home or a company uses energy in its day to day business. In addition many commercial buildings are built speculatively, hence the eventual use of the building is unknown.

Many different assessment systems are in use at present. These were reviewed in Section 4 of the Phase 1 report. The tools that are in Government ownership and that are to be used for meeting the methodology requirement of the EU Directive on the energy performance of buildings are:

- For non-domestic buildings – SBEM; and
- For dwellings – SAP and rdSAP, with SERT under development.

The other systems assume that this has already been calculated and use the final figure in their assessment criteria.

The leading contenders for the benchmarking tools are SAP and SBEM because they allow most flexibility and give direct calculations of CO₂ emissions.

7 WHO WOULD ADMINISTER A SCHEME?

This study addresses the possibilities of local authorities administering any such scheme via its planning activities. Hence local authorities were contacted in Phase 2 to discuss their views on the carbon trading concept.

8 WHAT POWERS WOULD BE REQUIRED?

Primary powers held by the Scottish Executive and Scottish Local Authorities that could be used to promote a trading scheme include⁴: the Sustainable Energy Act (Scotland), Planning policy under the relevant paragraphs of the Town and Country Planning (Scotland) Act, and the powers of well being allowed for in the Local Government in Scotland Act 2003

It is most likely that any scheme would be administered via local authority planning activities. However, historically, local authorities have faced various legal barriers when delivering some sustainable development initiatives via the planning system. Amongst the local authorities contacted in Phase 2 there were a range of views over which power may be appropriate to provide the necessary support. Some observed that developers with a good legal department could often overturn negative planning decisions. The introduction of a power to promote ‘well-being’ (discussed below) was designed to remove these barriers by giving local authorities the power to do anything they consider likely to promote or improve the well-being of their area or the people within that area. Hence we anticipate that the planning system will be used, with the specific powers under the power of ‘well being’ may be suitable to support this.

The power of well being was introduced in the Local Government in Scotland Act 2003 which has three interconnected core themes: Best Value, Community Planning and Power of Well-Being. Sustainable development is seen as a cross-cutting aim of the Act and the discussions below focus on this.

Best Value

The Act states a “duty to secure Best Value in local government service”. In relation to sustainable development, this may include sustainable procurement of goods or a requirement for all new local authority buildings to be of a particular environmental standard.

Community Planning

The Act states that “community strategies need to be taken forward by Community Planning Partnerships and they have a specific role in promoting the well-being of the areas they serve”. In relation to sustainable development, such CPPs might include local energy groups that bring together stakeholders from all areas of society with an aim to reducing consumption.

Power of Well-Being

This is the part of the Act with the most potential for facilitating the adoption of a carbon trading/offset scheme.

⁴ Phase 1 report, section 5 – review of powers and policies

The definition of ‘well-being’ has been left open to allow local authorities the flexibility of interpretation, but could include environmental well-being and cover such issues as improvement of building stock or promotion of clean air and renewable technologies.

For local authorities, the power should be regarded as a ‘first’ rather than ‘last’ resort. Rather than searching for another specific power that would justify a planning requirement, the power of well-being can be used as a catch-all.

This power would appear to offer scope for implementing a local carbon trading/offset scheme, however this would require legal advice to confirm this.

9 WHAT IS CARBON OFFSETTING?

Carbon offsetting is the process by which an organisation or individual can invest in carbon-saving projects to ‘neutralise’ an amount of carbon dioxide emissions. At its simplest level, an individual could invest in tree planting to offset the carbon emissions produced by a holiday flight; at its most complex, an organisation could analyse its whole mode of working and commit to long-term investment in a renewable energy technology.

For the purposes of this project, we are dealing with smaller scale emissions and possibly offsetting on a voluntary basis. There are many existing schemes that enable organisations to voluntarily offset CO₂ emissions through a variety of different projects.

A well known form of carbon offsetting is planting trees. Trees absorb CO₂ and, via photosynthesis, release oxygen. However, this should not be considered the panacea for offsetting all CO₂ emissions. Most tree-planting schemes are based on a 100-year time-span, with the necessary CO₂ emissions being absorbed over that time. There are considerable long-term risks (agriculture, disease, etc.) that may prevent a planted tree reaching the necessary maturity to offset the CO₂. Where tree-planting is to be considered, it should be in a sustainably managed forest planted with native species to encourage local biodiversity. More trees than required should be planted to give the best chance of the required minimum reaching maturity.

Alternatively, organisations can offset their CO₂ emissions by investing in suitable carbon saving projects. Typically these would involve renewable energy or direct energy savings. Most projects also have a wider sustainability context, e.g. improvements to local employment.

It is recommended that all carbon offsetting projects should be subject to independent verification by third parties.

Points to Consider:

- Tree-planting is unlikely to be viable given the potential scale of CO₂ emissions to be offset.

- Many carbon offset projects are based overseas in developing countries. The market research with local authorities uncovered a strong preference for projects that delivered local benefits, economic as well as environmental. Hence these forms of carbon offset may not be as suitable.
- The cost of carbon offsetting is small when compared to whole project cost. It should not be seen as a 'get-out' clause by developers to avoid sustainable design options. There should be a requirement for developers to first make active attempts at directly reducing CO₂ emissions before turning to offsets. This would also reduce their offset costs.

One option might be for the Scottish Executive to set up its own series of carbon-saving projects, funded through carbon offsetting. It could be designed so that investments are made in Scotland and would reap additional sustainability benefits for the country.

10 WHAT EXAMPLES ARE THERE?

A number of case studies⁵ on the use by local authorities of innovative approaches to encourage lower carbon emissions in new or existing development were included in Section 2 of the Phase 1 report.

While these do not include a carbon trading scheme for new development, the case studies show some elements that may be needed in a scheme.

These helped to inform the conclusions of this research with regard to the possible scope, limitations and design of any such scheme that may be considered by local authorities in Scotland.

A very brief summary of four case studies is below (refer to the phase 1 report for further detail): A summary table is included at the end of this section with information on all schemes considered in the Phase 1 Report.

Kirklees Council – UK ETS Approach

Kirklees is the only UK authority to sign up for the UK Emissions Trading Scheme (UK-ETS), introduced post-Kyoto. They have made a commitment to reduce emissions from a representative portfolio of council buildings (254 buildings of the 600 that the council is responsible for) by 1,000 tonnes of CO₂ by the end of 2006 (approximately 12%).

London Borough of Merton – Area-Based Planning Gain Approach

The London Borough of Merton is addressing carbon reduction through an innovative use of the planning system. Within Merton Borough there are a number of development sites (wide ranging in size) that are potentially of significant value to property developers. Hence there is active competition by developers to develop these sites. For this reason, the London Borough of Merton are encouraging sustainable developments by offering the advantage of greater land area availability for sustainable development approaches. This allows sustainable developers to offset

⁵ Phase 1 report, section 2 – case studies on carbon trading

the additional costs of low carbon housing through increased development size. Currently, on an ad-hoc basis, Merton Borough offer three options to developers.

For all three options, the building fabric must match or exceed the Energy Efficiency standards set in the Government's Housing Energy Efficiency Best Practice Guide, and in addition the scheme must meet the following requirements:

Option 1 – A Zero Emission / Carbon Neutral Development

- 100% CO₂ emission reduction - overall annual CO₂ emissions to atmosphere are zero.
- Up to 3.0 ha net site area of mixed use development potential.
- All heat and hot water for homes and work places generated from renewable energy sources within site boundaries.

Option 2 – Energy Efficient Development - A

- Up to 2.50 ha net site area of mixed-use development potential.
- Enough electricity is generated within the site boundaries to match the annual electrical demand for the entire live / work community using fossil fuels - allows for on-site gas-fired combined heat and power meeting the majority of the developments' energy needs.

Option 3 – Energy Efficient Development - B

- Up to 2.25 ha net site area of mixed-use development potential.
- Allows for individual gas powered central heating using condensing boilers, with the development importing mains electricity.

Merton Borough Council apply these criteria through their site development briefs. In terms of powers, they have references to sustainable development in their Unitary Development Plan (UDP) and Supplementary Planning Documents, but are wary of making decisions to reject developments on the grounds of un-sustainability as these documents are not very descriptive and it is not clear what legal strength they would have if a development were to take a rejection to the planning appeal stage.

Merton Borough Council hope to put these new criteria into their Local Development Framework (which is replacing the UDP) by end 2007, and are currently lobbying for support from Government to clarify the power councils have to make planning decisions on the basis of sustainability, so that they can feel confident of legal protection if a rejected development chooses to take a decision to the planning enquiry stage.

The legal underpinning for Merton's 10% policy comes from Section 8 of the Governments Planning Policy Statement 22 on Renewable Energy. The Scottish Executive would need to include a similar clause into SPP6 its version of PPS22 - and then make it clear to its pool of Planning Inspectors that this means that they will support local authorities at planning inquiries if a developer decides to go to a Planning Appeal (because a local authority planning committee throws out a planning application because it doesn't include 10% renewables).

Milton Keynes Council – Offset Fund Approach

134,000 new homes are planned for the Milton Keynes and South Midlands area by 2016. Based on conservative estimates, carbon emissions are expected to rise 25% by 2025. The aim of Milton Keynes Council is to achieve Zero Carbon growth in spite of the projected future increases in housing and population. They propose that this be achieved through a three pronged approach; reducing emissions, making use of renewable energy, and as an interim measure, through making payments into a Carbon Offset Fund.

Milton Keynes Council have a Sustainable Construction policy in their Local Plan (Town and Country Planning Act 1990) for any development of more than 5 dwellings or 1,000 m² (for non-residential use). One of the requirements in the Local Plan relates to the “carbon neutrality” of a development. They specify that the development should either be neutral, or if not, the resultant carbon emissions should be mitigated by paying money into a Carbon Offset Fund. This money can then be invested elsewhere (locally) in carbon saving activities, such as solutions for fuel poverty, and developing local expertise and a technology base in low Carbon Technologies. Investment in tree planting schemes that would enhance Milton Keynes' green spaces has not entirely been ruled out, but this is considered to be less cost effective than other measures.

One of the major issues encountered on the Milton Keynes project has been a difficulty in communicating the “Carbon Offset Fund” concept to developers. This may have been due to the complexities involved in this unfamiliar concept. Communicating the concept clearly and obtaining input from developers will be an important factor in the future success of similar schemes.

Milton Keynes Council believe they will experience a number of advantages due to Carbon offsetting, including the ability to use funds to target the most needy fuel-poor or regeneration areas, creation of jobs, local investment and benefits to developers as the carbon offset option is often a cheaper way of achieving carbon savings than implementing measures on-site.

Newcastle City Council – Voluntary Offset Fund Approach

Newcastle is hoping to become the first CarbonNeutral city by 2025. The city will need to save 1.8 million tonnes CO₂ a year to achieve this aim. The CarbonNeutralNewcastle campaign, founded by Newcastle City Council in association with Future Forests, is directed and managed by a Steering Group of Sponsors. It is a not-for-profit campaign under the control of the Community Foundation serving Tyne and Wear, and funding for the campaign comes from sponsorship, individuals and businesses running CarbonNeutral programmes. Sponsors include Scottish Power, Newcastle City Council, the Environment Agency and Newcastle International Airport, with partners including the Energy Saving Trust and the Carbon Trust.

The programme has three stages. Firstly the carbon footprint of the organisation or development is determined. Secondly, suggestions are made for reducing this. Finally, for every tonne of CO₂ that cannot be reduced, money for 'carbon credits' is paid into the CarbonNeutral Newcastle Fund.

The fund is distributed to local low/no carbon projects such as solar panels or loft insulation, which generate the 'carbon credits' to compensate for these emissions. There is a strong preference for energy efficiency, renewable energy, and other projects that directly reduce emissions, whilst carbon sequestration by planting trees is a smaller component. The target is for 70-80% of funds raised to be invested in projects with the other 20-30% being used to promote and manage the campaign. A group of core partners have provided the funding for the first year of the campaign so that this target split can be achieved from the outset.

The programme provides the following incentives to business: help measuring CO₂ emissions, a Carbon Assessment report (useful for environmental reporting), advice on how to reduce CO₂ and therefore save money, the service to 'neutralise' remaining emissions, positive customer engagement and corporate positioning.

Summary of Case Study Schemes

A number of the case studies have demonstrated that it is possible to utilise the planning system to encourage lower carbon impact developments through giving planning advantages that can result in financial advantage to the developer. This is a relatively low cost option for both parties involved. Carbon funds, either voluntary or compulsory, bring considerable benefits to the local area. They may be viewed as placing a burden on business, but it seems likely that sooner or later these companies will have to account for their carbon impacts, and this approach provides them a cost-effective means of achieving this.

Other more prescriptive approaches may require developers to utilise a minimum percentage of renewable energy in their developments, or plant a specified area of trees corresponding to the area of the development. Renewable energy policies are common place in council plans, and encourage the development of local renewables. However, it should be noted that planting of trees is not always the most effective or financially viable option for Carbon Offset. In most cases, carbon funds will offer a more flexible approach, giving developers potentially more affordable options and enabling revenues to be spent locally in fuel-poor or regeneration areas.

The following table provides a summary of all the case studies that are included in the Phase 1 report.

UK Case Studies Summary

| Active / Planned? | Local Authority | Approach | Costs | Is it working? | Power Used / Mean to implement | Benefits | Difficulties |
|-------------------|----------------------------|--|--|--|--|--|--|
| Active | Kirklees Local Authority | UK Emissions Trading Scheme for existing council buildings | No investment required but training and research was required including adapting the energy monitoring software used by the Council. | CO ₂ savings achieved with certified evidence to support. The UK-ETS is an excellent driver and tool to implement many energy saving schemes and initiatives towards GHG reduction, including ensuring that they have a process to obtain more accurate and timely meter readings from the utilities. | Trading under the right to practice "Good Governance". Major legal negotiations required to implement. | <ul style="list-style-type: none"> Government incentive funding & funding from other sources Strategic gains – council reputation and experience Insurance against future reductions targets via the ability to bank any over achieved savings. | <ul style="list-style-type: none"> Wider understanding of trading concept and why council was involved Utility understanding of role and data provision. Training, research and time requirements |
| Planned | London Borough of Merton | Planning Gain/Planning Powers for improved performance. | 3% to 3.5% for developers | Initial reaction from developers was cautious. Actual emissions savings not yet quantified. | Legislative backup from UDP / ODPM / Local Plan and Planning powers (Town and Country Planning Act 1990) as well as wider Government policy on renewables. | <ul style="list-style-type: none"> More revenue to developer for land area Council housing needs met in smaller area Renewables policy results in fundamental emissions reductions. | |
| Active | London Borough of Sutton | Planning Gain/Planning Powers | Minimal so far | Not yet on a large scale. | Local Plan and Planning powers (Town and Country Planning Act 1990) | <ul style="list-style-type: none"> More revenue to developer for land area Council housing needs met in smaller area | |
| Planned | East Hertfordshire Council | Tree Planting | Minimal so far | Not yet implemented | UDP/Local Plan and Planning powers (Town and Country Planning Act 1990) | <ul style="list-style-type: none"> Improved recreation and wildlife areas Regeneration benefits Wood for biomass to meet renewable targets | <ul style="list-style-type: none"> Some objections from developers to new Local Plan. |
| Planned | Milton Keynes Council | Offset Fund | Costs of administration of the fund are estimated at 8% of fund value. | Not yet implemented | Local Plan and Planning powers (Town and Country Planning Act 1990) | <ul style="list-style-type: none"> Carbon funds can be directed to fuel-poor and regeneration areas. Jobs and local investment due to Fund spending Cheaper option for companies for carbon abatement than further in-house action. | <ul style="list-style-type: none"> Wider and internal understanding of the concept of a carbon fund and why it is needed. |
| Active | London Borough of | Renewable Energy and | Minimal so far | Not yet on a large scale.?? | Local Plan and Planning powers (Town and Country | <ul style="list-style-type: none"> More revenue to developer for land area | |

| Active / Planned? | Local Authority | Approach | Costs | Is it working? | Power Used / Mean to implement | Benefits | Difficulties |
|-------------------|------------------------|-----------------------|--|---|--------------------------------|---|--|
| | Ealing | Planning Gain | | | Planning Act 1990) | <ul style="list-style-type: none"> • Council housing needs met in smaller area | |
| Active | Newcastle City Council | Voluntary Offset Fund | Annual cost estimated at £200k pa. Set up costs are in addition to this sum. | Savings so far 55,000 tonnes carbon, 0.5% of Newcastle's emissions. | Voluntary | <ul style="list-style-type: none"> • Carbon funds can be directed to fuel-poor and regeneration areas. • Jobs and local investment due to Fund spending • Cheaper option for companies for carbon abatement than further in-house action. • Companies benefits through receiving Carbon Assessment reports (useful for environmental reporting), advice on how to reduce CO₂ and save money, service to 'neutralise' remaining emissions, positive customer engagement and corporate positioning | <ul style="list-style-type: none"> • Scepticism about the reasons for establishing the campaign – particularly as it was led and organised by city council staff. • View of the scheme as a PR exercise. • Political support from local authorities and other partner organisations slow to establish itself • Lack of insight and action on environmental issues within the various departments of the City Council and partner organisations. Difficulties in collecting reliable local data on energy consumption due to the nature of the privatised supply industry and the fact that there was no established comprehensive and accurate emissions registry. |

11 WHAT FORMS OF CARBON REDUCTION WOULD BE ACCEPTABLE?

Assessing the potential benefits of carbon trading schemes requires details of the costs of the direct measures to reduce carbon from new buildings, along with the costs of potential carbon trading approaches. The following table summarises the main features of the carbon reduction options reviewed within the study (refer to Phase 2 Report, Section 4 – potential carbon saving measures):

Table 2 Summary of Carbon Trading Measures

| Method | (NPV/NAC) Cost per tonne Carbon (£/tC) | Advantages | Disadvantages |
|---|--|---|---|
| Energy Efficiency Measures | Depends on technology – see cost curves (section 17) | Direct emissions reduction Well Proven | Costs will be progressively higher to meet more stringent targets. |
| Renewable Energy Measures | Depends on technology but higher than energy efficiency – see cost curves (section 17) | Direct emissions reduction | Some technology issues to address. Costs higher than energy efficiency measures. |
| Purchase of ROCs | ~ £350 | Trading system already in place | High cost. Uncertainty over carbon savings |
| Via EU-ETS | ~£55 ⁶ | Done through central ‘bank’. | Onerous calculation/verification procedures. |
| Self-trading (between sites owned by same developer) | Depends on resultant emissions | Scheme done in-house. | Requires third-party verification. May encourage improved environmental design. |
| Carbon Offset: Planting trees | ~£55 | Cheap. Visual impact. | CO ₂ not offset until trees reach maturity. Requires guarantee of trees reaching maturity. Not viable for large-scale carbon savings due to the area of planning required. |
| Carbon Offset: Investment in third party projects | ~£18-£73 | Cheap. Wider sustainability benefits. | Quite possibly likely to be outwith local context (i.e. outwith local authority). |
| Carbon Offset: Investment in local projects | Depends on LA | Potentially wide range of local benefits. | Requires local administration. |

⁶ Based on a notional EU-ETS price of €20/tCO₂

The review of possible **CO₂ saving methods** concluded that:

- Energy efficiency measures are likely to be the mainstay of the trading scheme although we would expect that by 2015 the majority of these measures would be introduced via building regulations. They could also be applicable as retrofitted measures, to existing housing stock, via an offsetting scheme.
- Renewable energy installations within new developments may play a significant part, but the performance and likely future costs of these technologies needs to be established.
- Carbon offsetting via renewable energy and energy efficiency carbon saving projects, as opposed to tree planting (as described in section 9), could play a major part, given the experience from the case studies, but this will not necessarily give immediate local benefits.
- Purchase and retirement of EU-ETS allowances could be used. However selling allowances would require full inclusion of participants in the EU-ETS, this is likely to be incompatible with a local authority carbon trading scheme.
- Purchase and retirement of ROCs is not likely to be a viable method of achieving target emissions.

12 WHAT DO PUBLIC SECTOR ORGANISATIONS THINK ABOUT THE IDEA?

In order to gather information on the wider views on carbon trading and offset approaches, a questionnaire was compiled which gave a background to carbon offset approaches and asked a number of questions on the more detailed issues. Key contacts were identified in local authorities and other public sector organisations across Scotland, and this list was added to with suggestions from interviewees on an ongoing basis.

Over 20 organisations and local authorities were contacted and asked to provide input to this report. Seven local authority responses were obtained, covering Aberdeen City, Dundee, Edinburgh, Fife, Renfrewshire and Highlands. In addition, responses were obtained from the Sustainable Scotland Network, the Royal Town Planning Institute and the NHS. One interviewee chose to have their comments un-attributable so no organisational details have been linked to this response.

In general, respondents felt that a carbon trading scheme could play a part in delivering climate change improvements, but they were split regarding the extent to which improvements could be achieved through such an approach. Many believed that a carbon trading scheme should be implemented as a component of a broader approach.

Respondents were split as to whether a percentage threshold or carbon neutral target should be set, with some suggesting that a percentage threshold could enable initial introduction, gradually moving towards a carbon neutral requirement. To date, there have been no implementations of local authority carbon trading schemes in Scotland,

although there has been interest in such approaches from a number of City Councils. Various potential pilot developments were suggested and some local authorities were willing to become involved in a pilot scheme.

Potential difficulties of a carbon trading approach included scheme complexity and scope definition, logistics of rolling out the scheme as well as the cost of setting up and running such a scheme and the cost impact to developers. A mandatory, country wide approach was favoured by respondents.

There were mixed views on the measures that should be deemed eligible to achieve carbon reductions. Some respondents argued for flexibility, others for limits or caps on the use of some indirect measures. A measure considered to be ineligible was tree planting due to; the vulnerability of this offset method, the minimal social/economic benefit, the debateable CO₂ uptake of trees and the potential that such an option would discourage efficient building design.

Suggested benefits included the raised profile for such mechanisms and related climate change issues, and local improvements such as increased employment, improved local environment, fuel poverty reductions, and the availability of the additional income stream for the local authority.

Views on implementation of such a scheme were mixed. Some respondents felt that a planning-based approach would lend itself well to a Scottish scheme, whereas others with more experience in the area of planning raised concerns about the risk of legal challenges and the lack of clear support for such a scheme within the current planning mechanisms. It was suggested that improved building regulations offered an alternative to a planning-based trading approach. Other opportunities suggested included using the “Power to Advance Well Being”, the “Local Government Act”, the “Best Value duty” or the “Strategic Environmental Assessment bill to enforce carbon reductions.

Various suggestions were made for calculating and verifying emissions, with some respondents favouring an approach based on existing benchmarks, whilst others believed that a new carbon-focused approach was required. Many felt that verification of emissions could present a major difficulty.

It was suggested that no developments be excluded from such a scheme. A wide range of savings mechanisms could be made available to developers, but control should be kept over the portfolio of savings mechanisms used to ensure scheme effectiveness.

In summary, local authorities and the other parties interviewed, were open-minded to carbon trading and offsetting schemes, although responses highlighted the potential complexity of such schemes and the diversity of views on implementation approaches.

13 WHAT DO PRIVATE SECTOR ORGANISATIONS THINK ABOUT THE IDEA?

Over 17 private sector organisations were contacted and asked to provide input to this research. Many of the organisations contacted felt unable to provide a response or were only able to provide a limited response to the questions posed.

This was a marked difference in response to that found from the public sector. In the opinion of the research team this reflects:

- That local authorities have an individual who is both responsible for sustainable development issues and who has involvement in the formulation or implementation of policy in this area.
- Private sector developers do not have an individual in this role, nor do they have an individual who responds to policy consultations or research studies.

In light of this we contacted a number of representative or trade bodies from the construction sector. We received a few outline comments but no detailed responses to the specific issues raised in the questionnaire.

We had anticipated that building developers would raise topics such as the cost of compliance, the practicality of some of the CO₂ reduction methods, the administrative arrangements etc. However in the absence of significant detailed responses to achieve a consensus of opinion we cannot include any detailed findings into the conclusions and recommendations of the research.

14 WOULD THIS BE A MANDATORY OR VOLUNTARY SCHEME?

The carbon trading scheme could be implemented on a voluntary or a mandatory basis. The public sector survey responses included views for, and against, a mandatory scheme, with a majority in favour of the mandatory approach.

Mandatory schemes are effective in terms of getting firms or organisations on board, although they often usually require thresholds for participation to capture the largest emitters, such as the de minimus threshold of 15 properties as mentioned earlier in this section.

There are insufficient past examples of emissions trading schemes with robust cost benefit data to determine if a voluntary or mandatory scheme would provide greater impact. However the voluntary schemes used to date (UK-ETS and CCAs) have involved significant forms of financial incentive for the participants.

It is clear that the potential carbon savings would be lower if a voluntary approach were to be taken. Estimating how much lower the savings may be is difficult to determine as there are no direct equivalents to draw upon.

The concept of carbon trading is relatively new and is totally new to the sectors and sizes of development considered in this study. This brings some uncertainty over the

costs and benefits of the scheme as well as a need to investigate in much greater detail the rules that would govern this type of scheme. In addition no significant views were offered by the construction sector on the carbon trading concept or the options for the implementation of the scheme. In these circumstances it would be premature to recommend a mandatory approach.

To encourage developer participation in a voluntary scheme sufficient incentives are required. These could take the form of favourable grant mechanisms to support the installation of the most cost effective technologies, a recognition scheme for the participating developers, support on the design and installation from the Carbon Trust and possibly an element of the area or density based planning gain approach such as those run in the London boroughs of Merton and Sutton respectively.

It could also be made clear that the medium term intention would be to make such a scheme mandatory at some time in the future and it would be beneficial for developers to get involved at the voluntary stage to prepare for the mandatory scheme, such as the philosophy behind the UK-ETS.

A voluntary carbon trading scheme using an offset fund could be considered as a useful means of carbon saving in its own right and as a stepping stone to the longer term goal of carbon neutrality with carbon trading.

15 WHAT ARE THE LIKELY ADMINISTRATIVE COSTS OF A SCHEME?

To estimate the actual administrative costs to run a carbon trading scheme is premature given the early stage of development. This is because the administrative costs depend on the proposed plans and rules, the scale of participants in the scheme and an idea of the likely adoption of energy efficiency measures that will be implemented over the next several years for each or most of the local authorities in Scotland.

However, the Milton Keynes Council example, as described in the Phase 1 Report, provides indicative figures for running their Offset Fund scheme, a scheme that aims to achieve zero carbon growth in the growing housing stock that is expected over the next ten years.

- The Milton Keynes scheme is expected to cost 8% of the fund that is raised, i.e. 8% of £600k to £1m per annum around £48k-£80k⁷.
- The cost is meant to cover 2,400 potential new dwellings per year.
- A pro rated adjustment would mean at a Scottish level, the cost of administering the scheme for 18,800 homes would be in the order of £375-£625k.

The administration costs for an offset fund do not necessarily provide enough evidence to determine the costs of administering a Carbon Trading scheme.

⁷ These costs are based on the employment of a full time administrator and the services of an accountant to ensure financial transparency.

Monitoring offset schemes are generally one off schemes, but trading might require more monitoring, verification, and certification of schemes and hence higher costs.

16 WHAT ARE THE POLICY COST SAVINGS?

This study (Phase 2, Section 4.6 – savings from carbon savings) estimated the total policy cost of achieving a 30% or a 100% carbon reduction compared to the proposed new building standards with, and without, carbon trading (see the following section for summary description of how this estimate was made). We have used EU-ETS prices as a convenient benchmark for the cost of carbon. The prices in the EU-ETS market fluctuate – we have used £55/tC for this, at the higher end of recent EU-ETS prices.

The case without carbon trading takes the total cost (or saving) of all the direct energy efficiency or renewable energy measures needed to deliver a 30% or 100% saving. In the case with carbon trading, if the cost of the measures required are higher than the cost of carbon trading then the carbon trading option is used in place of the measure. The results are shown below:

Table 3 – Savings from Carbon Trading

| | 30% Reduction | 100% Reduction = Carbon Neutral |
|-------------------------------------|---------------|------------------------------------|
| Without Carbon Trading (£k p.a.) | -140 | 5,057 |
| With Carbon Trading (£k p.a.) | -186 | 182 |
| Saving (£k) | 46 | 4,875 |

As discussed in the Phase 2 report, and in the following section, the cost curves used in this analysis are an approximate representation of the opportunities to reduce carbon from new homes in Scotland.

From the results we view the estimated benefit of carbon trading to deliver a 30% reduction as being negligible but substantial for a 100% reduction.

Hence we conclude that carbon trading could offer significant and valuable benefits if carbon neutrality were to be the aim, as to achieve carbon neutrality would require extensive use of less cost effective measures such as biomass boilers, ground source heat pumps and solar water heating, along with very high levels of insulation.

For smaller reductions up to 30% direct measures may be more effective and the potential benefit of carbon trading is not as convincing.

The economic analysis that we were able to undertake shows a significant saving of around £5 million a year if carbon trading was used to achieve carbon neutrality for 18,800 new homes in Scotland. While the economic analysis includes a number of assumptions, the size of this benefit is such that we are confident that a significant benefit would remain if the analysis were developed further. There are likely to be additional benefits from the non domestic sector.

17 HOW HAVE THESE SAVINGS BEEN ESTIMATED?

To assess the potential benefits of carbon trading we need to consider the conventional measures that could be used to directly reduce the energy use of new developments, e.g. insulation, building materials, low carbon heating etc.

To undertake this we use cost curves to show the amount of carbon that can be saved by the different direct measures along with the net costs (or net savings) of these measures in terms of £/tonne carbon saved. The box below provides an introduction to the key concepts that are presented in a cost curve.

Cost Curves – An Introduction

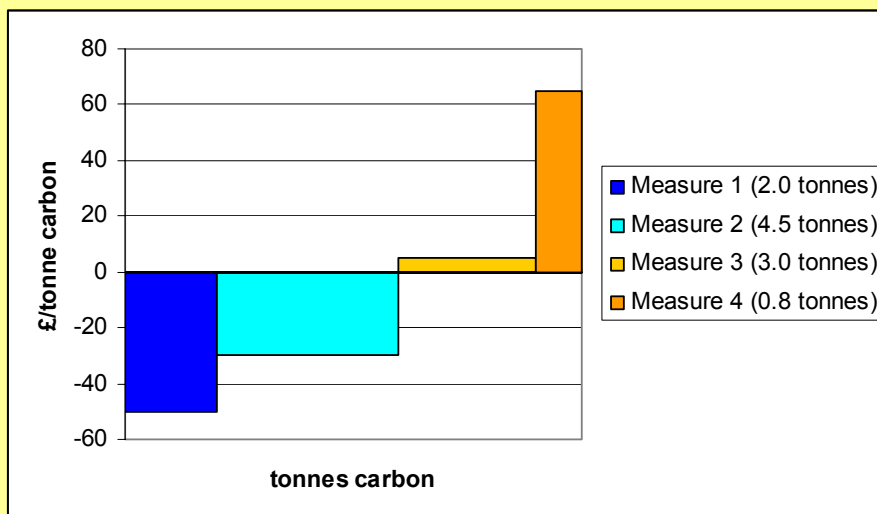
Cost curves show in one diagram the potential carbon saving measures that could be used in a particular sector, or group of buildings or any collection of facilities that consume energy.

The amount of carbon saved is a simple assessment for each of the measures, using standard emission factors to calculate annual carbon savings. The net cost (or net saving) is calculated as the Net Present Value (NPV) of the measure divided by the annual carbon savings. The NPV is the initial cost of the measure less the discounted energy cost savings over the life of the measure.

The cost curves show each of the measures that could be applied as a rectangle. The width of the rectangle (X axis) is the amount of carbon saved. The height of the rectangle (Y axis) is the cost (or savings) per tonne of annual carbon savings.

The rectangles for each measure are shown on the same chart starting with the most cost effective (highest savings) on the left, with the less cost effective measures in order working to the most expensive on the right hand side of the chart.

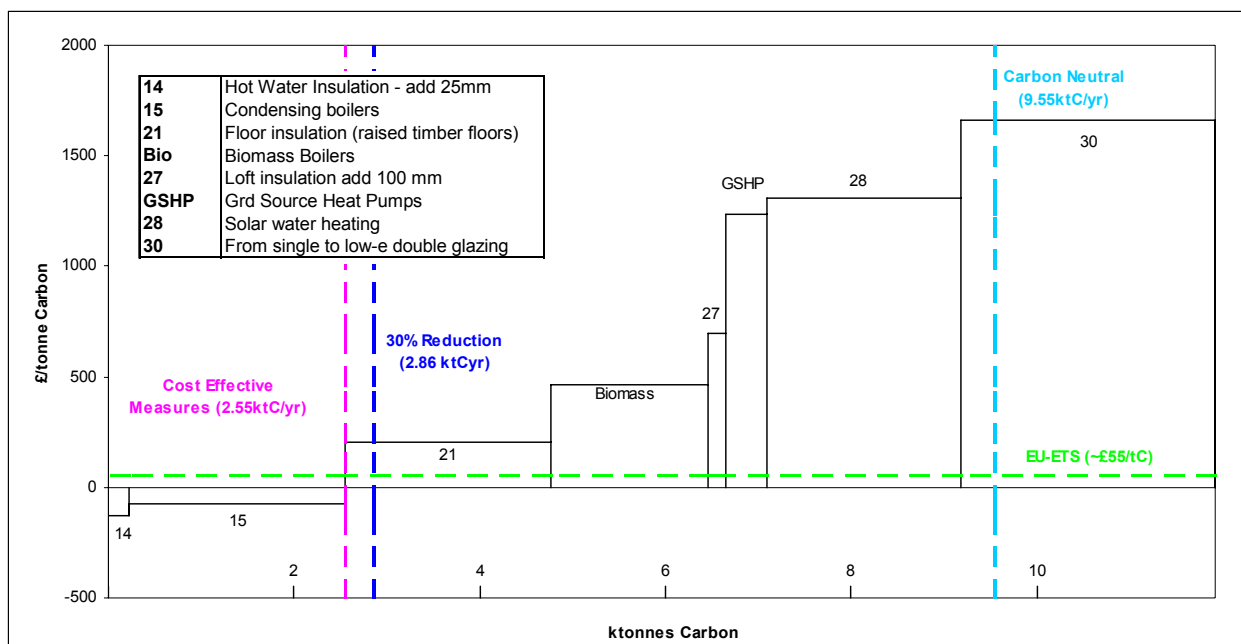
The simple example below has four carbon saving measures. The most cost effective is measure 1 which saves 2 tonnes of carbon pa at a net saving of £50/tonne. Only measures 1 & 2 are cost effective as measures 3 & 4 have a net cost rather than a net saving.



There are very few published cost curves for the non domestic sectors and most of these are for industry and focus on measures that reduce process energy. Hence we have concentrated this part of the analysis on the domestic sector.

In this study we have used cost curves published by BRE in 2005⁸. This report provides four curves for 2001, 2010, 2020 and 2050. Hence this includes measures that will be relevant to new buildings (e.g. PV) as well as retrofit measures.

We have used these existing domestic cost curves and removed measures that are not relevant to this study. While this is not a perfect representation, this is a more useful approach than simply using the published data sets. In the longer term there could be value in the development of specific cost curves for Scotland to support future policy analysis work.



⁸ Reducing carbon emissions from the UK housing stock, BRE480 2005

18 WHAT CARBON REDUCTION TARGET COULD BE SET AND WHEN?

The economic analysis shows that 15 ktC p.a could be saved if all new buildings in Scotland were to be carbon neutral, falling to 4.5 ktC p.a. for a 30% saving on the building regulations introduced before 2015. For the domestic sector alone the savings are 9.5 ktC p.a. for carbon neutrality and 2.9 ktC p.a. for a 30% reduction.

To achieve a 30% saving the analysis includes measures that are cost effective, i.e. measures that save money over their lifetime, e.g. additional hot water tank insulation (saving £120/tC) and condensing boilers (saving £75/tC). However to achieve carbon neutrality requires extensive use of measures that are not cost effective, i.e. they have a net cost over their lifetime. Carbon neutrality would require extensive use of floor insulation (cost £200/tC), biomass boilers (£460/tC) and solar water heating (£1,300/tC).

In light of this, the economic analysis indicates that the cost benefit of carbon trading is negligible for a 30% reduction in carbon emissions beyond the proposed new building regulations, but is substantial for the carbon neutral target. The proposed changes to the building regulations are likely to come into effect in 2007. The next revision is likely to commence in 2009 and may take carbon emissions to around the 30% reduction target studied. The benefits of carbon trading to achieve this target are negligible.

However if higher standards are introduced in building regulations, perhaps in the period 2015 to 2020, this may increase pressure to incorporate measures that are at the present time not cost effective. Carbon trading can offer significant cost benefits in this situation.

19 WHAT STEPS COULD BE TAKEN IN THE LEAD UP TO A CARBON TRADING SCHEME?

A voluntary carbon trading scheme using an offset fund, based on the model used in the Milton Keynes example (Phase 1 Report, Section 2.2.5) could be considered as a useful means of carbon saving in its own right and also as a stepping stone to the longer term goal of carbon neutrality with carbon trading.

It could also be made clear that the medium to long term intention would be to make such a scheme mandatory at some time in the future and it would be beneficial for local authorities and developers to get involved at the voluntary stage to prepare for the mandatory scheme, such as the philosophy behind the UK-ETS.

Many of the energy and carbon saving measures in existing buildings are highly cost effective, i.e. the £/tC is negative. Therefore an offset fund could be more cost effective than trading via EU-ETS.

To encourage developer participation in a voluntary scheme sufficient incentives are required. These could take the form of favourable grant mechanisms to support the installation of the most cost effective technologies, a recognition scheme for the participating developers, support on the design and installation from the Carbon Trust and possibly an element of the area or density based planning gain approach such as those run in the London boroughs of Merton and Sutton respectively.

20 WHAT OTHER ISSUES ARE IMPORTANT?

In undertaking this research we have encountered a number of gaps in the information that was required to undertake a comprehensive analysis. These include:

Cost Abatement Curves

Investigations into sourcing a suitable cost abatement curve for new dwellings in Scotland proved to be a challenge. The curves used focused on existing dwellings and represented carbon saving opportunities across the UK housing stock⁹. The thermal properties of different types of properties in Scotland will not precisely match those found in the UK as a whole.

As a result of the above findings it is clear that further research is required in order to generate suitable curves, specific to the situation in Scotland. These curves should reflect the Scottish building stock and the cost of installing measures as part of a new build. The curves should also take into account the higher heating needs in Scotland and possibly the future power generation mix within Scotland. The higher levels of renewable generation in the future will have an effect on the cost effectiveness of certain measures (such as Micro CHP or other renewable methods of generating electricity).

Suitable Technologies

One conclusion to be drawn from reviewing the data used in the derivation of the cost abatement curves and other information sources is that there are only a relatively small number of measures available for new buildings. This is due to several factors, one is that the focus of the market and policy analysis has to date been on the larger target of improving energy use in existing buildings. Hence a number of measures are still in a relatively early stage of their market development cycle, and hence have high costs associated e.g. Photovoltaics.

These curves also show that a number of measures are cost effective, however these measures are, or could easily be, covered by the building regulations (such as thermal insulation, heating controls and condensing boilers). Other measures considered such as household appliances would obviously not be within the control of developers, unless white goods were being supplied as part of the new house package.

⁹ Reducing carbon emissions from the UK housing stock, BRE480 2005

Schemes which can demonstrate the most promising, and currently most cost effective technologies, (such as solar thermal and biomass heating or CHP serving suitably sized developments) are therefore required in order to develop a knowledge base for these technologies and their incorporation into new developments. There are a number of Scottish local authorities currently considering biomass schemes, which would provide useful demonstration value to private, and public sector developers.

Building Regulations

Prior to deciding the level of carbon abatement to be targeted by the carbon trading scheme it is essential that an assessment is made of how far the building standards have pushed energy efficiency design standards.

Data on Non domestic Developments

Existing data on the amount and type of non domestic development in Scotland is sparse. Thus it appears that there is a need to establish methods for capturing data on the non domestic new build market in Scotland which should include information on types, size and number of developments.

21 CONCLUSIONS AND RECOMMENDATIONS

Research Findings

The research examined many aspects of carbon trading, recognising that carbon trading can take many forms and that the methodologies and rules for a carbon trading scheme need to be tailored to the situation of the participants.

The research examined the opportunity for carbon trading to achieve better levels of energy use than required by the building standards.

The research estimated that the carbon emissions due to the heating needs of new developments in the domestic and non-domestic sectors in Scotland is 15 ktC pa. Hence if new developments were to be to carbon neutral, i.e. zero carbon emissions from energy use, the contribution to the SCCP is modest, but will accumulate with each year's new build. Thus 10 years of carbon neutral development would save up to 150 ktC p.a.

This summary report reviews each of the main issues associated with carbon trading for new developments, while this Executive Summary draws these results together to consider five possible options.

1. Do Nothing

Given the new Scottish Target in the SCCP, there is a need for new policy measures to reduce emissions across all sectors of the economy including new buildings. Furthermore UK policy on energy and climate change points to further pressure to reduce carbon emissions, e.g. the aspiration for a 60% reduction by 2050. Importantly, the standards of today's new buildings will influence emissions far into the future. Hence the option to do nothing further to reduce emissions from new buildings would be out of step with this backdrop.

2. Raising the Building Standards

The energy used in new buildings, and hence carbon emissions, have been progressively reduced as the building regulations have set more stringent standards. The next set of changes for Scotland are being finalised in 2006 for implementation in 2007. The present proposals for 2007 are expected to reduce energy use by 23%. The next revision is likely to commence in 2009 and will reduce energy further. The expectation is that future trend will be for energy standards to become increasingly stringent.

Clearly this trend is beneficial, supports the SCCP and longer-term carbon reduction aspirations and should continue. However there is a law of diminishing returns that means that the costs of achieving further savings becomes progressively higher. These costs typically stem from the diminishing returns from simple energy savings measures such as adding progressively greater layers of insulation and from the use of technology measures that are more expensive such as micro renewables.

Hence if carbon trading or carbon offsetting can offer a complementary but additional carbon reduction at lower cost, this is worth serious consideration.

3. Carbon Offsetting

Carbon offsetting is a simple form of carbon trading by which an organisation or individual can invest in carbon-saving projects to ‘neutralise’ an amount of carbon dioxide emissions. At its simplest level, an individual could invest in tree planting to offset the carbon emissions produced by a holiday flight; at its most complex, an organisation could analyse its whole mode of working and commit to long-term investment in a renewable energy technology.

One form of carbon offsetting is planting trees. Trees absorb CO₂ and, via photosynthesis, release oxygen. Most tree-planting schemes are based on a 100-year time-span, with the necessary CO₂ emissions being absorbed over that time. There are considerable long-term risks (agriculture, disease, etc.) that may prevent a planted tree reaching the necessary maturity to offset the CO₂. Where tree planting is to be considered, it should be in a sustainably managed forest planted with native species to encourage local biodiversity. More trees than required should be planted to give the best chance of the required minimum reaching maturity.

A significant amount of land would be required if this form of offsetting was to be used extensively. The market research found concerns about tree planting offsets amongst local authorities. These included the concern over the amount of land, and that the economic and environmental benefits would not be local.

The research found that other forms of offsetting scheme had been developed by some local authorities in England.

4. Offset Funds

Offset funds are a specific form of carbon offsetting that has been developed by a number of local authorities in England, notably Newcastle and Milton Keynes.

Milton Keynes Council have a Sustainable Construction policy in their Local Plan (Town and Country Planning Act 1990) for any development of more than 5 dwellings or 1,000 m² (for non-residential use). One of the requirements in the Local Plan relates to the “carbon neutrality” of a development. They specify that the development should either be neutral, or if not, the resultant carbon emissions should be mitigated by paying money into a Carbon Offset Fund. This money can then be invested elsewhere (locally) in carbon saving activities, such as solutions for fuel poverty, and developing local expertise and a technology base in low Carbon Technologies. Investment in tree planting schemes that would enhance Milton Keynes' green spaces has not entirely been ruled out, but this is considered to be less cost effective than other measures.

This form of scheme addresses the concerns raised by local authorities. In addition, by investing in retrofitting energy saving measures in homes suffering fuel poverty this will achieve carbon savings at a much lower cost and address a major social and economic problem.

A key advantage of the offset fund is that the investment is in energy efficiency measures such as basic insulation that are highly cost effective.

5. Carbon Trading

Carbon trading schemes are considered a more cost effective alternative to stricter regulation due to the simple principle of allowing an organisation with a lower cost of abatement to sell surplus credits to an organisation with higher costs of abatement. Defra quote that¹⁰:

“Emissions trading is emerging as a key instrument in the drive to reduce greenhouse gas emissions. The rationale behind emission trading is to ensure that the emission reductions take place where the cost of the reduction is lowest thus lowering the overall costs of combating climate change.”

The US lead-in-gasoline reduction programme (launched in the mid-1970s), the SO₂ trading programme, and the Los Angeles RECLAIM (Regional Clean Air Incentives Market) programme are among the best known early examples of emissions trading.

In the UK examples include the UK Emissions Trading Scheme, set up as a pilot for the wider EU Emissions Trading scheme.

The economic analysis for this research project compares direct implementation of energy efficiency and renewable energy measures for new dwellings with the cost of trading in the EU-ETS. Two targets are considered for new homes, a 30% reduction over the levels likely to be required by the 2007 building regulations and 100% saving i.e. carbon neutrality.

We conclude that carbon trading could offer significant and valuable benefits, up to £5 million a year, if carbon neutrality were to be the aim, as to achieve carbon neutrality would require extensive use of less cost effective measures such as biomass boilers, ground source heat pumps and solar water heating, along with very high levels of insulation.

For smaller reductions up to 30% direct measures may be more effective and the potential benefit of carbon trading is not as convincing.

The concept of carbon trading is relatively new and is totally new to the sectors and sizes of development considered in this study. This brings some uncertainty over the costs and benefits of the scheme as well as a need to investigate in much greater detail the rules that would govern this type of scheme. In addition no significant views were offered by the construction sector on the carbon trading concept or the options for the implementation of the scheme. In these circumstances it would be premature to recommend a mandatory carbon neutral trading scheme.

¹⁰ Defra website, <http://www.defra.gov.uk/environment/climatechange/trading/>

However in the long term, taking aspirations for 2050 into account, the aim of carbon neutrality for new building developments, and hence a possible role for carbon trading, cannot be ruled out for the future.

Practical Issues

The research examined a number of practical issues associated with carbon trading, including the benchmarking tools, the number of developments that would be covered, along with examples of initiatives that are already undertaken by some local authorities. This summary report and the detailed volumes describe these in detail.

Conclusions & Recommendations

We conclude that there is a strong and increasing need to implement further initiatives that deliver carbon savings for new building developments. Carbon trading is proven as an effective way to deliver carbon savings at lower costs. However in the case of new building development in Scotland, the scale of carbon savings on offer is modest and carbon trading is not the simplest policy measure to set up and administer. In addition the benefits of carbon trading are not significant unless the reduction targets are set at very high levels. So in the short to medium term we conclude that carbon trading for new building developments should not be implemented.

This said, the research found examples of initiatives undertaken by local authorities in England that incorporate some of the elements of a trading scheme. In particular the offset fund approach used in Newcastle and Milton Keynes addresses some of the problems of the high cost of measure needed to make significant savings, yet avoids the complexity of full carbon trading and addresses some of the concerns expressed for other forms of carbon offset.

While these examples are in their early days, they could provide a valuable and worthwhile route for local authorities in Scotland to address the emissions of new buildings in the short to medium term.